

# PHILOSOPHY MEETS COGNITIVE SCIENCE



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Research Group

Organization and contact: Prof. Dr. Markus Werning.

Website: [www.rub.de/phil-lang](http://www.rub.de/phil-lang).

Venue: Thursday, 15 July 2010, 16-18, in room HMA 40.

All interested students, scientists, and scholars are cordially invited to the following talk of the research colloquium:

**Jun.-Prof. Dr. Motoharu Yoshida**  
(Ruhr-Universität Bochum)

## Persistent Firing and Information Processing in the Medial Temporal Lobe

Neurons in various brain regions show repetitive spiking activity that persists after termination of the triggering stimulus. This type of activity is called persistent firing and is believed to be important for short-term retention of information and possibly for long-term storage of memory in the medial temporal lobe (MTL). In this talk, I will introduce my recent work on the role of persistent firing in spatial navigation and the underlying mechanisms that support persistent firing in the MTL areas such as the postsubiculum and the entorhinal cortex (EC). The rat postsubiculum has head direction cells that fire persistently when the animal's head is oriented in particular directions. In our recent work, we have shown that neurons from postsubiculum show persistent firing in single neuron level, independently from synaptic network, using in vitro whole-cell recordings. This suggests that persistent firing in the head direction cells observed in-vivo is supported by this single cell level mechanism. I will then introduce our modeling study of grid cells which shows that persistent firing in the medial EC might be an important mechanism for grid cells. In addition we recently found that persistent firing is stronger in the intermediate location along the medio-lateral axis in the medial EC where grid cells are recorded in-vivo. These results suggest that persistent firing could contribute to the grid cell formation in the EC. Finally, I will present a modeling study which proposes the role of the hippocampus which is tightly interconnected to the EC.

Yoshida received his PhD in Information Technology at the Kyushu Institute of Technology, Fukuoka, Japan. Before coming to the Ruhr-University Bochum he had post-doctoral research fellows at McGill University, Montreal Neurological Institute and at Boston University, Center for Memory and Brain.